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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/674,568
Filing Date: September 29, 2003
Appellant(s): DAVIS ET AL.

Keith P. Taboada
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 1/15/2009 appealing from the Office action mailed 6/25/2008.

(1) Real Party in Interest

A statement identifying the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings, which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

US 6379980	Anthony J. Toprac	4-2002
US 5329381	John H. Payne	7-1994
US 6616759	Tanaka et al	9-2003

US 6130415	Peter A. Knoot	10-2000
US 20030222231	Yonezawa et al	12-2003
US 20040028267	Shoham et al	2-2004
US 20020006677	Egermeier et al	1-2002
US 2003/0141572	Robert John Wilby	7-2003
US 6136712	Klippert II et al	10-2000
US 20040060659	Morioka et al	4-2004
WO 01/24254 A1	Petrucci et al	4-2001
US 6390019	Grimbergen et al	5-2002
US 6368982	Bin Yu	4-2002
US 6406924	Grimbergen et al	6-2002
US 6319767	Cha et al	11-2001

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1, 3-4, 6-7, 17-18, 20 and 23-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Anthony J. Toprac (US 6379980) in view of (John H. Payne -US 5329381 or Tanaka et al-US 6616759), Knoot (US 6130415) and further in view of (Yonezawa et al - US 20030222231 or Shoham et al-US 20040028267 or Egermeier et al - US 20020006677) as evidenced by Robert John Wilby (US patent publication 2003/0141572).

Anthony J. Toprac teaches that as technology improvements facilitate smaller critical dimensions for semiconductor devices, the need for reduction of errors increases dramatically. Critical dimensions of the sub-sections generally have to be within a predetermined acceptable margin of error for semiconductor devices to be within acceptable manufacturing quality and teaches that the present invention is directed to overcoming problems and improving this process.

Anthony J. Toprac discloses a method of monitoring an etch process and discloses pre-etch measurement (Fig 3-310 and Fig 1- 100, 120) using a pre-etch metrology tool (120).

This pre-etch measurement data is transferred to process controller (150) which monitors the etch process in cooperation with the etching tool (130) and end point monitor (140). The endpoint monitor is a spectrometer (Col 3 line 32- Col 5 line 9). Anthony J. Toprac may adjust the process recipe or provide an etch recipe based upon pre-etch measurement and target etch rate or etch depth (Col 4 line 23- Col 5 line 28).

Anthony J. Toprac further teaches that the etch process monitor allows etching to a certain predetermined depth and monitor for remaining thickness after removal (Col 4 lines 53 to Col 5 line 9) to determine the etch rate and performance of the process. The pre-etch metrology

tool disclosed is a commercially available tool using optical ellipsometry or reflectometry (See Robert John Wilby US patent publication 2003/0141572 paragraph 0099).

Toprac does not disclose the details of the pre-etch measurement techniques and specially noise elimination by filtering of outliers for the accuracy of the measurement.

John H. Payne discloses special filter to remove outliers (these are erroneous data points lying outside the collection of good data points) and teaches that this is a nonlinear noise-cleaning filter (Col 8 lines 17-24).

Similarly Tanaka et al also recommend removing outliers (filtering) (Col 5 lines 15-16) for accuracy of data processing.

Therefore it would have been obvious for one of ordinary skill in the art at the time of invention to have used outlier filter to remove noise in order to improve the accuracy of pre-etch. measurement.

Toprac in view of Payne or Tanaka don't disclose modulating the monitored radiation at a frequency of 10 Hz during the monitoring of etch process.

It is well known in the art that signals having noise are modulated or chopped and measured in synchronism with a lock-in-amplifier. The frequency of modulation depends upon several factors including the frequency of the signal. A modulation frequency of 10Hz is disclosed by Peter A. Knoot (Col 7 lines 43-47) while measuring optical pyrometer signals indicating temperature.

Therefore modulating measurement signal by 10 Hz would have been obvious to one of ordinary skill in the art at the time of invention.

Regarding the limitation of "analyzing the pre-etch measurement information to determine that a patterning is of a sufficient quality to allow for etching of the substrate" it is noted that when there are several processes done sequentially on a substrate every process step adds value to the substrate and the usefulness and success of one process depends upon the success of a preceding processes. If the preceding process results in a defective product there would be no sense in any subsequent processing investment. In the industry it is called "garbage in garbage out". For this reason there are quality checks at every stage of the process.

Toprac does not directly suggest determination of pre etch quality. However, since he discloses determining a process recipe it must do so according to the target and the measurement. So that if the pre-etch quality is bad it would be hard to find process adjustment to get an acceptable product.

Yonezawa et al discloses an inspection of a substrate with photoresist to measure a resist removal width (Paragraph 50) and goes on to judgment part to determine acceptable or unacceptable for subsequent processing.

Similarly Shoham et al disclose inspection of a substrate to determine if allowed to continue to next process (Flow chart of Fig 2) and Egermeier et al disclose inspection and analysis of wafer contamination to decide if further processing should continue (Flow chart of Fig 1).

Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to use pre-etch measurement to decide if etch processing should continue on the basis of patterning quality which would be preceding step.

Regarding claim 18 mask trim is a regular etch process using reactants known to one of ordinary skill in the art. Therefore above discussion applies equally to mask trim process.

Regarding claim 20, the process disclosed above is applicable to photoresist-patterned masks as is well known in the art.

3. Claims 1, 3-4, 6-9, 11-13, 15, 17-18, 20, 23-26, 28-30 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Klippert II et al (US 6136712) in view of (John H. Payne -US 5329381 or Tanaka et al-US 6616759), Knoot (US 6130415) and further in view of (Yonezawa et al -US 20030222231 or Shoham et al -US 20040028267 or Egermeier et al -US 20020006677).

Klippert II et al disclose a method of monitoring an etch process and discloses pre-etch measurement (Col 4 line 64-Col 5 line 10) before starting an etch process which is further monitored by the etch process monitor to allows etching to a certain end point time to a predetermined depth and monitor for remaining thickness after removal (abstract). The pre-etch metrology tool for thickness measurement and during etching process monitoring is disclosed to be through commercially available metrology systems employing interferometric measurement and monitoring techniques (Col 4 line 45 to Col 5 line 30). For the etch process etch recipe is designed appropriate to requirement (Col 6 lines 13-20 and Col 7 lines 29-40).

Klippert II et al like Toprac as above however do not disclose outlier filtering during pre-etch measurement and intensity of radiation monitoring during etch process.

John H. Payne, Tanaka et al, Knoot, Yonezawa et al, Shoham et al and Egermeier et al are applied to complement the teachings of Klippert in a way, as above, to get to the claimed invention.

4. Claims 1, 3-4, 6-9, 11-13, 15, 17-18, 20, 23-26, 28-30 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morioka et al (US 20040060659) in view of (John H. Payne -US 5329381 or Tanaka et al-US 6616759), Knoot (US 6130415) and further in view of (Yonezawa et al -US 20030222231 or Shoham et al -US 20040028267 or Egermeier et al - US 20020006677).

Morioka et al disclose a method of monitoring an etch process and discloses pre-etch measurement of CD (Fig 2-240a) before starting an etch process which is further monitored by the etch process monitor to allows etching to a certain end point time to a predetermined depth and monitor for remaining thickness after removal (abstract). The pre-etch metrology tool for thickness measurement and during etching process monitoring could be CD-SEM or optical measurement like scatterometer (Para 28 and 109).

Morioka et al however do not disclose the details of the measurement techniques and specially noise elimination for the accuracy of the measurement.

Morioka et al like, Klippert II et al and Toprac as above, however do not disclose outlier filtering during pre-etch measurement and intensity of radiation monitoring during etch process.

John H. Payne, Tanaka et al, Knoot, Yonezawa et al, Shoham et al and Egermeier et al are applied to complement the teachings of Klippert in a way, as above, to get to the claimed invention.

5. Claims 1, 3-4, 6-9, 11-13, 15, 17-18, 20, 23-26, 28-30 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Petrucci et al (WO 01/24254 A1) in view of (John H. Payne -US 5329381 or Tanaka et al-US 6616759), Knoot (US 6130415) and further in view of (Yonezawa et al -US 20030222231 or Shoham et al -US 20040028267 or Egermeier et al -US 20020006677).

Petrucci et al disclose a method of monitoring an etch process and discloses pre-etch measurement (Paragraph 18) before starting an etch process which is further monitored by the etch process monitor to allows etching to a certain end point time to a predetermined depth and monitor for remaining thickness after removal (abstract). The pre-etch metrology tool for thickness measurement is disclosed to be through preferably a laser system based on ellipsometry (Paragraph 20) and during etching process monitoring employing interferometric measurement and monitoring techniques (Paragraph 5).

Petrucci et al however do not disclose the details of the measurement techniques and specially noise elimination for the accuracy of the measurement.

Petrucci et al like Morioka et al, Klippert II et al and Toprac as above, however do not disclose outlier filtering during pre-etch measurement and intensity of radiation monitoring during etch process.

John H. Payne, Tanaka et al, Knoot, Yonezawa et al, Shoham et al and Egermeier et al are applied to complement the teachings of Klippert in a way, as above, to get to the claimed invention.

6. Claims 1, 3-4, 6-9, 11-13, 15, 17-18, 20, 23-26, 28-30 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Grimbergen et al (US 6390019) in view of (John H. Payne-US 5329381 or Tanaka et al-US 6616759), Knoot (US 6130415) and further in view of (Yonezawa et al -US 20030222231 or Shoham et al -US 20040028267 or Egermeier et al -US 20020006677).

Grimbergen et al disclose a method of monitoring an etch process and discloses pre-etch measurement (Col 13 lines 17-25) before starting an etch process which is further monitored by the etch process monitor to allows etching to a certain end point time to a predetermined depth and monitor for remaining thickness after removal (abstract). The pre-etch metrology tool for thickness measurement is disclosed to be a commercial system using reflectance thickness measurement system and during etching process monitoring employing interferometric or ellipsometry measurement and monitoring techniques (Col 7 line 60-Col 8 line30).

Grimbergen et al however do not disclose the details of the measurement techniques and specially noise elimination for the accuracy of the measurement.

Grimbergen et al like Petrucci et al, Morioka et al, Klippert II et al and Toprac as above, however do not disclose outlier filtering during pre-etch measurement and intensity of radiation monitoring during etch process.

John H. Payne, Tanaka et al, Knoot, Yonezawa et al, Shoham et al and Egermeier et al are applied to complement the teachings of Klippert in a way, as above, to get to the claimed invention.

7. Claims 10, 20 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Anthony J. Toprac (US 6379980) in view of (John H. Payne -US 5329381 or Tanaka et al-US 6616759), Knoot (US 6130415) and further in view of (Yonezawa et al -US 20030222231 or Shoham et al -US 20040028267 or Egermeier et al - US 20020006677) as applied to claims 1, 3-4, 6-7, 17-18, 20 and 23-24 and further in view of Bin Yu (US 6368982).

Anthony J. Toprac discloses a method of monitoring an etch process in cooperation with the etching tool (130) and end point monitor (140) which is basically a spectrometer (Col 3 line 32- Col 5 line 9). Anthony J. Toprac further teaches that the etch process monitor allows etching to a certain end point time to a predetermined depth and monitor for remaining thickness after removal (Col 4 lines 53 to Col 5 line 9).

Anthony J. Toprac and others as above do not disclose measurement of features such that horizontal etch and vertical etch accuracy could be validated from measurement of each other.

Bin Yu discloses a method of mask trim and discloses that the mask undergoes etching from all sides and leaves a scaled down length and discloses that the two sides and the top are trimmed by substantially the same trim length (Fig 1to Fig 3 and Col 1 line 50- Col 2 line5).

Therefore it would have been obvious for one of ordinary skill in the art at the time of invention to have used correlation between horizontal etch and vertical etch to validate the accuracy of trim during trim etch.

8. Claims 10, 20 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morioka et al (US 200400606136712) in view of (John H. Payne -US 5329381 or Tanaka et al-US 6616759), Knoot (US 6130415) and further in view of (Yonezawa et al -US 20030222231 or Shoham et al -US 20040028267 or Egermeier et al - US 20020006677) as

applied to claims 1, 3-4, 6-7, 17-18, 20 and 23-24 and further in view of Bin Yu (US 6368982).

Morioka et al and others as above do not disclose measurement of features such that horizontal etch and vertical etch accuracy could be validated from measurement of each other.

Bin Yu discloses a method of mask trim and discloses that the mask undergoes etching from all sides and leaves a scaled down length and discloses that the two sides and the top are trimmed by substantially the same trim length (Fig 1to Fig 3 and Col 1 line 50- Col 2 line5).

Therefore it would have been obvious for one of ordinary skill in the art at the time of invention to have used correlation between horizontal etch and vertical etch to validate the accuracy of trim during trim etch.

9. Claims 16 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Grimbergen et al (US 6390019) in view of (John H. Payne -US 5329381 or Tanaka et al-US 6616759), Knoot (US 6130415) and (Yonezawa et al - US 20030222231 or Shoham et al -US 20040028267 or Egermeier et al -US 20020006677) as applied to claims 1, 3-4, 6-9, 11-13, 15, 17-20, 23-26, 28-30 and 32 and further in view of Grimbergen et al (US 6406924).

Grimbergen et al disclose a method of monitoring an etch process and discloses pre-etch measurement (Col 13 lines 17-25) before starting an etch process which is further monitored by the etch process monitor to allows etching to a certain end point time to a predetermined depth and monitor for remaining thickness after removal (abstract). The pre-etch metrology tool for thickness measurement is disclosed to be a commercial system using reflectance thickness

measurement system and during etching process monitoring employing interferometric or ellipsometry measurement and monitoring techniques (Col 7 line 60-Col 8 line30).

Grimbergen et al in US 6390019 and others as above do not disclose correlation between spectrum minima and width of structures formed during etch. However as the structures are etched the minimas and maxima of the interferometric signal shift since the position of minima and maxima are indicative of etch depth as taught in other patent (US 6406924 – Col 1 line 59-Col 2 line 8).

Therefore it would have been obvious for one of ordinary skill in the art at the time of invention to have used correlation between minima and width of etch to validate the accuracy of trim during trim etch.

10. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Anthony J. Toprac (US 6379980) in view of (John H. Payne -US 5329381 or Tanaka et al-US 6616759), Knoot (US 6130415) and (Yonezawa et al -US 20030222231 or Shoham et al -US 20040028267 or Egermeier et al -US 20020006677) as applied to claims 1, 3-4, 6-7, 17-18, 20 and 23-24 and further in view of Cha et al (US 6319767).

Anthony J. Toprac discloses a method of monitoring an etch process and discloses pre-etch measurement (Fig 3-310 and Fig 1- 100, 120) by pre-etch metrology tool (120) this data is transferred to process controller (150) which monitors the etch process in cooperation with the etching tool (130) and end point monitor (140) which is basically a spectrometer (Col 3 line 32-Col 5 line 9). Anthony J. Toprac further teaches that the etch process monitor allows etching to a certain end point time to a predetermined depth and monitor for remaining thickness after

removal (Col 4 lines 53 to Col 5 line 9). The pre-etch metrology tool disclosed is a commercially available tool using optical ellipsometry or reflectometry (See Robert John Wilby US patent publication 2003/0141572 paragraph 0099).

Anthony J. Toprac and others as above do not disclose the mask etch trim process to be a regular plasma etch.

Cha et al disclose that the photoresist mask is reduced by plasma (Col 3 lines 30-35).

Therefore it would have been obvious for one of ordinary skill in the art at the time of invention to have used plasma to reduce photoresist mask produced by lithography to further reduce by plasma for reduction of feature size of layer etched by using the patterned photoresist mask.

11. Claims 50-59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Grimbergen et al (US 6390019) in view of (John H. Payne - US 5329381 or Tanaka et al-US 6616759), Knoot (US 6130415) and (Yonezawa et al -US 20030222231 or Shoham et al -US 20040028267 or Egermeier et al -US 20020006677) and further in view of Cha et al (US 6319767) and Bin Yu (US 6368982).

Grimbergen et al disclose a method of monitoring an etch process and discloses pre-etch measurement (Col 13 lines 17-25) before starting an etch process which is further monitored by the etch process monitor to allows etching to a certain end point time to a predetermined depth and monitor for remaining thickness after removal (abstract). The pre-etch metrology tool for thickness measurement is disclosed to be a commercial system using reflectance thickness

measurement system and during etching process monitoring employing interferometric or ellipsometry measurement and monitoring techniques (Col 7 line 60-Col 8 line30).

Grimbergen et al however do not disclose the details of the measurement techniques and specially noise elimination for the accuracy of the measurement.

John H. Payne discloses special filter to remove outliers (these are erroneous data points lying outside good data points) and teaches that this is a nonlinear noise-cleaning filter (Col 8 lines 17-24).

Therefore it would have been obvious for one of ordinary skill in the art at the time of invention to have used outlier filter to remove noise in order to improve the accuracy of measurement of pre-etch.

Grimbergen et al or Payne don't disclose modulating the monitored radiation at a frequency of 10 Hz.

It is well known in the art that signals having noise are modulated or chopped and measures in synchronism with a lock-in-amplifier. The frequency of modulation depends upon several factors including the frequency of the signal. However a modulation frequency of 10Hz is disclosed by Peter A. Knoot (Col 7 lines 43-47).

Therefore modulating measurement signal by 10 Hz would have been obvious to one of ordinary skill in the art at the time of invention.

Grimbergen et al or Payne and Knoot do not disclose the etch process to be a mask etch trim process and do not explicitly disclose width measurement.

Yonezawa et al discloses an inspection of a substrate with photoresist to measure a resist removal width (Paragraph 50) and goes on to judgment part to determine acceptable or unacceptable for subsequent processing.

Cha et al disclose that the photoresist mask is reduced by plasma (Col 3 lines 30-35).

Therefore it would have been obvious for one of ordinary skill in the art at the time of invention to have used monitoring techniques taught by Grimbergen to mask etch trim process to further reduce size of features in a patterned photoresist mask.

Grimbergen et al in view of John H. Payne, Knoot, Yonezawa et al and Cha et al do not disclose measurement of features such that horizontal etch and vertical etch accuracy could be validated from measurement of each other.

Bin Yu discloses a method of mask trim and discloses that the mask undergoes etching from all sides and leaves a scaled down length and discloses that the two sides and the top are trimmed by substantially the same trim length (Fig 1 to Fig 3 and Col 1 line 50- Col 2 line5) to provide correlation between horizontal and vertical etch.

Therefore it would have been obvious for one of ordinary skill in the art at the time of invention to have used correlation between horizontal etch and vertical etch to validate the accuracy of trim during trim etch.

12. Claims 50-59 are also rejected under 35 U.S.C. 103(a) as being unpatentable over Anthony J. Toprac (US 6379980) or Klippert II et al (US 6136712) or Petrucci et al (WO 01/24254 A1) or Morioka et al (US 20040060659) in view of (John H. Payne -US 5329381 or Tanaka et al-US 6616759), Knoot (US 6130415) and (Yonezawa et al -US 20030222231 or

Shoham et al -US 20040028267 or Egermeier et al -US 20020006677) and further in view of Cha et al (US 6319767) and Bin Yu (US 6368982).

Anthony J. Toprac, Klippert II et al, Petrucci et al and Morioka et al disclose all the limitations of these claims except as discussed above.

Yonezawa et al, John H. Payne, Tanaka, Knoot, Cha et al and Bin Yu provide the missing limitations as in the rejections discussed above.

(10) Response to Argument

The Appellants argue that,

Toprac does not teach or suggest using pre-etch measurements for setting etch parameters prior to etching. Moreover, the pre-measurement as taught by Toprac is not utilized in combination with an etch process monitoring to determine critical dimension of structures formed in a substrate.

In response, it is noted that as discussed above, Toprac's disclosure is about improvements to etching process of semiconductor structures having critical dimensions using appropriate tools and processes.

The Appellants argue that Payne is not an analogous art.

In response, it is noted that Payne is directed to analyzing an image just like Toprac, Klipper II, others and claimed invention does for pre-etch structures. Therefore they are trying to

solve the same problem. Further Tanaka is recited for the same function in the art of semiconductor processing.

The Appellants argue that,

Tanaka teaches removal of outliers but does not teach or suggest pre-measure thickness or critical dimensions of a structure, as recited by claim 1 and 18. Tanaka does not teach or suggest analyzing the pre-etch measurement information to determine that a patterning is of a sufficient quality to allow for etching of the substrate and to determine process parameters to an etch process, and other things.

In response it is noted that Tanaka is used for its teaching of filtering outliers. Appellant's argument against references individually is not proper since the rejection relies on combination.

Appellant's argument against Knoot is not fully understood. The Appellants appear to argue that Knoot is not in appellant's field of endeavor.

In response, it is noted that Knoot is directed to semiconductor processing and more specifically to monitoring of optical signals. Therefore Knott is not in a different field of endeavor.

Appellant's argument about Yonezawa, Shoham and Egermeier and Wilby are not relevant to what these references are used for. Yonezawa, Shoham and Egermeier are used to show that in a semiconductor manufacturing involving processes using several tools in a sequence, it is usual to asses the result of previous process to make a decision, weather to

proceed with the next process. The pre-etch measurement taught in Anthony J. Toprac, Klippert II et al, Petrucci et al, Morioka et al and Grimbergen would allows them to do that assessment.

The Appellants argue that,

1 Klippert II teaches measuring or estimating an etching rate of an etch process to better control the depth formed or etched in a layer disposed on a substrate during an etching process. However, Klippert II does not teach or suggest using an outlier filter to filter a pre-etch critical dimension measurement data, utilizing the pre- etch critical dimension measurements to in-situ monitor an etch process, or using the pre-etch critical dimension measurement in combination with an etch process monitoring to determine critical dimension of structures formed in a substrate.

2 Morioka does not teach or suggest using an outlier filter to filter a pre-etch critical dimension measurement data, utilizing the pre-etch critical dimension measurements to in-situ monitor an etch process, or using the pre- etch critical dimension measurement in combination with an etch process monitoring to determine critical dimension of structures formed in a substrate. Furthermore, Morioka does not teach or suggest analyzing a pre-etch measurement information to determine process parameters to an etch process.

3 Petrucci teaches using an endpoint algorithm to detect an endpoint of an etching process. However, Petrucci does not teach or suggest using an outlier filter to filter a pre-etch critical dimension measurement data, utilizing the pre-etch critical dimension measurement to in-situ monitor an etch process, or using the pre-etch critical dimension measurement in

combination with an etch process monitoring to determine critical dimension of structures formed in a substrate.

4 Grimbergen teaches using a process monitoring system mounted on top of a processing chamber to monitor a process. However, Grimbergen does not teach or suggest using an outlier filter to filter a pre-measurement data, utilizing the pre-etch critical dimension measurement to in-situ monitor an etch process, or using the pre-etch critical dimension measurements in combination with an etch process monitoring to determine critical dimension of structures formed in a substrate.

In response to above four arguments, it is noted that this is only an attack on individual references and as discussed earlier is not proper when the rejection relies on combination of references.

The Appellants argue that,

Toprac does not teach or suggest analyzing a pre-etch measurement information to determine that a patterning is of a sufficient quality to allow for etching of a substrate and that Toprac does not teach or suggest using pre-etch measurements for setting etch parameters prior to etching.

In response it is noted that Toprac discloses pre-etch measurement for the purpose of determining parameters for the actual etch.

Toprac does not explicitly teach a decision about poor quality. It is however obvious that poor quality during a pre-etch measurement would make it harder to find recipe parameters to do etch processing to get to a desired target (since quality would not be poor if by proper recipe

parameters one could get the target result). It would be commonsense not to allow further processing if next stage would not yield a product of acceptable quality.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Ram N Kackar/

Primary Examiner, Art Unit 1792

Conferees:

/Parviz Hassanzadeh/

Supervisory Patent Examiner, Art Unit 1792

/Michael Barr/

Supervisory Patent Examiner, Art Unit 1792